

**CLAIMS**

1. A vessel, comprising:  
a body;  
a conduit disposed near the body;  
a distributed temperature system for monitoring temperature in the body and comprising an optical fiber positioned in the conduit; and  
the conduit and the optical fiber extending such that they provide a temperature profile of temperatures in at least a portion of the body.
2. The vessel of claim 1, further comprising a control unit for automatically controlling parameters in the body depending on the temperature profile obtained by the distributed temperature system.
3. The vessel of claim 1, wherein the conduit is a metal conduit.
4. The vessel of claim 3, wherein the metal conduit is constructed from stainless steel.
5. The vessel of claim 1, wherein the conduit is located outside of the body.
6. The vessel of claim 1, wherein the conduit is located inside of the body.

7. The vessel of claim 1, wherein the optical fiber is pumped into the conduit by way of fluid drag.
8. The vessel of claim 1, wherein:
  - a process is performed within the vessel; and
  - a control unit automatically controls parameters in the body depending on the temperature profile to ensure that the process is within an acceptable range.
9. The vessel of claim 8, wherein at least one of the parameters is pressure.
10. The vessel of claim 8, wherein at least one of the parameters is temperature.
11. The vessel of claim 8, wherein:
  - the process has a plurality of stages within the vessel; and
  - the control unit controls the parameters in the body depending on the temperature profile to ensure that each stage of the process is within an acceptable range.
12. The vessel of claim 1, wherein the vessel is part of a distillation system.

13. The vessel of claim 12, wherein the distillation system separates liquid components for subsequent processing.
14. The vessel of claim 1, wherein vapour enters the vessel at one end of the vessel and liquid enters the vessel at another end of the vessel.
15. The vessel of claim 14, wherein the vapour enters at a top end of the vessel and the liquid enters at a bottom end of the vessel.
16. The vessel of claim 1, further comprising:
  - a plurality of valves that control parameters within the body; and
  - the parameters are controlled depending on the temperature profile to ensure that a process taking part in the body is within an acceptable range.
17. The vessel of claim 16, further comprising a control unit for automatically controlling the parameters depending on the temperature profile to ensure that a process taking part in the body is within an acceptable range.
18. A method for monitoring a vessel, comprising:
  - disposing a conduit near a body of the vessel;

monitoring temperature in the body by use of a distributed temperature system including an optical fiber that is located within the conduit; and

extending the conduit and the optical fiber such that they provide a temperature profile of temperatures in at least a portion of the body.

19. The method of claim 18, further comprising automatically controlling parameters in the body depending on the temperature profile obtained by the distributed temperature system.

20. The method of claim 18, wherein the disposing step comprises disposing the conduit outside of the body.

21. The method of claim 18, wherein the disposing step comprises disposing the conduit inside of the body.

22. The method of claim 18, further comprising pumping the optical fiber into the conduit by way of fluid drag.

23. The method of claim 18, further comprising:  
performing a process within the vessel; and  
automatically controlling parameters in the body depending on the temperature profile to ensure that the process is within an acceptable range.

24. The method of claim 23, wherein at least one of the parameters is pressure.
25. The method of claim 23, wherein at least one of the parameters is temperature.
26. The method of claim 23, further comprising automatically controlling the parameters depending on the temperature profile to ensure that each of a plurality of stages of the process is within an acceptable range.
27. The method of claim 18, further comprising separating liquid components in the vessel for subsequent processing.
28. The method of claim 18, further comprising feeding vapour at one end of the vessel and feeding liquid at another end of the vessel.
29. The method of claim 28, further comprising feeding vapour at a top end of the vessel and feeding liquid at a bottom end of the vessel.
30. The method of claim 18, further comprising:  
controlling parameters within the body by the use of a plurality of valves; and  
controlling the parameters depending on the temperature profile to ensure that a process taking part in the body is within an acceptable range.

31. The method of claim 30, further comprising automatically controlling the parameters depending on the temperature profile to ensure that a process taking part in the body is within an acceptable range.